

REMARKS

The present Amendment and Response is intended to be fully responsive to all points of objections and/or rejections raised by the Examiner and is believed to place the application in condition for allowance. Applicants assert that the present invention is new, non-obvious and useful. Prompt reconsideration and allowance of the claims are respectfully requested.

Status of the Claims

Claims 1-20 are pending in the current application.

Claim 1-2 and 18-20 have been amended for consistency purpose.

Applicants assert that amendments of claims 1-2 and 18-20 are editorial in nature, do not alter the scope of the claims being amended, and add no new matter.

Remarks to Claim Objections

The Office Action of July 22, 2010 objected claim 2 for informalities.

Applicants have amended claim 2 in response to the above claim objection by specifically incorporating changes suggested by the Office Action. Additionally, Applicants have reviewed and made editorial changes to claims 1 and 18-20 to make them consistent in terms of terminologies being used in the claims.

In view of the above, Applicants respectfully request that the above objection of claim 2 be withdrawn.

Remarks to Claim Rejections

Claim Rejections - 35 USC §103

The Office Action of July 22, 2010 rejected claims 1-8, 10-15, and 17-19 under 35 U.S.C. §103(a) as being unpatentable over Bernstein et al. (US 2002/0151150, “Bernstein”) in view of Smalley et al. (US 2002/0159944, “Smalley”).

Applicants respectfully disagree.

Applicants respectfully submit that independent claims 1, 2, and 11 recites distinctive features and elements that are not taught, suggested, or implied by prior art references of record, in particular by Bernstein and Smalley. Such distinctive features include, *inter alia*, “conductive carbon nanotubes lining said trench” of claimed trench-type storage device.

The Office Action of July 22, 2010 admits that Bernstein does not teach barrier layer 24 being a conductive carbon nanotube but contends that Smalley teaches a similar device wherein the capacitor electrode is formed of conductive carbon nanotubes, citing paragraph [0018] & [0029] lines 1-10. Applicants respectfully disagree.

Applicants have carefully analyzed the cited paragraphs [0018] and [0029], even the entire reference, and were unable to find any evidence indicating that Smalley teaches a trench capacitor that is similar to the structure shown in FIG. 6 of Bernstein, contrary directly to what is contended by the Office Action. Neither any of the three drawings in Smalley illustrates a trench capacitor. The three drawings are about transmission electron micrographs of carbon nanotube materials, and have nothing to do with capacitors. In fact, Smalley has focused on purification of single-wall carbon nanotubes using an all gas-phase process and not on any particular devices.

To the most, Smalley described that the absence of impurities in nanotube may enhance the performance of any materials, devices, and articles that comprise nanotube, and such devices may include electrodes of capacitors. However, Smalley does not teach, suggest, or even imply any capacitor structures, not to mention a trench capacitor that is similar to the one in Bernstein. More specifically, Smalley does not teach, suggest, or even imply a trench structure and lining the trench with conductive carbon nanotubes as being specifically recited by claims 1, 2, and 11 of the present invention. In other words, Smalley does not cure the above admitted deficiency of Bernstein.

Applicants respectfully submit that it is non-obvious to replace conductive barrier layer 24 in Bernstein with carbon nanotubes of Smalley because none of the references teaches using carbon nanotube as a liner to line a trench. Should the Examiner continue to contend that Smalley describes using carbon nanotube as electrodes, Applicants would like to further point out that Smalley is deficient in teaching how a carbon nanotube may

be applied as an electrode (in the absence of teaching any capacitor structure), whether the carbon nanotube may be used as a cap layer, the bulk of a trench conductor (such as trench conductor 18 in Bernstein), or as a liner lining a trench. In fact, using carbon nanotube as the bulk of trench conductor (such as as trench conductor 18 in Bernstein) may even create a non-functional trench capacitor, whose functionality is affected by the orientation of carbon nanotubes used as trench conductor.

Moreover, Applicants would like to point out that the alleged motivation by the Office Action bears no relevance in motivating a person skilled in the art to combine Smalley with Bernstein. This is because, even though Smalley stated that “purified carbon nanotubes are stable and resistant to environment attack and thus enhancing the performance of the device”, the statement is only relevant when being compared with using carbon nanotubes that are not purified. Smalley never teaches, suggests, or implies that purified carbon nanotubes will enhance the performance of device that uses metal such as, for example, tantalum as barrier layer as the trench capacitor shown in FIG. 6 of Bernstein.

According to MPEP 2142, in order to establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. In view of the above, Applicant respectfully submits that claims 1, 2, and 11 are not obvious over Bernstein or Smalley, alone or in combination, since a *prima facie* case of obviousness against claims 1, 2, and 11 have not been properly established.

Claims 3-7, 10, and 18-19 depend from claim 1; claim 8 depends from claim 2; and claims 12-15 and 17 depend from claim 11. Claims 3-8, 10, 12-15, and 17-19 include all the distinct features of claims 1, 2, and 11, respectively, and other distinguishing features and elements. Therefore, claims 3-8, 10, 12-15, and 17-19 are patentable for at least the same reasons as discussed above with regard to claims 1, 2, and 11.

The Office Action of July 22, 2010 rejected claims 6 and 9 as being unpatentable over Bernstein, in view of Smalley, and further in view of Yoshikazu Homma (“Growth

of suspended carbon nanotube..." dated 09/16/2002); and rejected claim 20 as being unpatentable Bernstein, in view of Smalley, and further in view of Widmann et al. (US 2001/0012658).

Applicants respectfully disagree.

Claims 6, 9, and 20 depend from claim 1 to include all the distinct features of claims 1 as well as additional distinguishing features and elements. Claims 6, 9, and 20 are patentable for at least the same reasons as discussed above with regard to claim 1.

In view of the above, Applicants respectfully request that rejections of claims 1-20 made under 35 U.S.C. §103(a) be withdrawn.

Conclusion

In view of the preceding remarks, Applicants respectfully submit that all pending claims are now in condition for allowance. Favorable reconsideration and allowance of the claims are respectfully requested.

No fees are believed to be due in connection with this paper. However, if there are any such fees due, please charge any such fees to the deposit account No. 09-0458.

Respectfully submitted,

/Yuanmin Cai/

Yuanmin Cai, Ph.D.
Agent for Applicants
Registration No. 56,513

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INTERNATIONAL BUSINESS MACHINE CORPORATION
Intellectual Property Law Department, East Fishkill
2070 Route 52, Bldg-321, Zip-482
Hopewell Junction, NY 12533
Tel: (845) 894-8469
Fax: (845) 892-6363